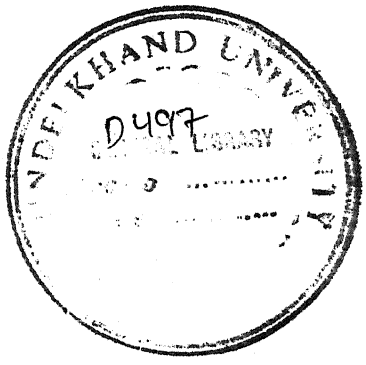
STUDY OF DERMATOGYPHICS IN CHILDREN WITH BRONCHIAL ASTHMA, ASTHMATIC BRONCHITIS AND BRONCHIOLITIS

THESIS

FOR

DOCTOR OF MEDICINE

(PAEDIATRICS)



BUNDELKHAND UNIVERSITY
JHANSI (U. P.)

1996 **PRAVEEN KUMAR RAJAN**

C E R T I F I C A T E

This is to certify that the work entitled "STUDY OF DERMATOGLYPHICS IN CHILDREN WITH BRONCHIAL ASTHMA, ASTHMATIC BRONCHITIS AND BRONCHIOLITIS", which is being submitted as a thesis for M.D.(Pediatrics) Examination, 1996 of Bundelkhand University, has been carried out by DR. PRAVEEN KUMAR RAJAN in the department of Pediatrics, M.L.B. Medical College, Jhansi.

He has put in the necessary stay in the department as per university regulations.

Dated : 27 - 11 - 95

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A C K N O W L E D G E M E N T

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Date : 27/11/95

(Praveen Kumar Rajan)

CONTENT

I N T R O D U C T I O N

INTRODUCTION

The term dermatoglyphics is derived from the Greek word 'derma' - skin and{glyphe' - curve. It is the study of epidermal ridges and their configurations and its application to diagnosis. The word dermatoglyphics was first proposed by Cummins and Midlo (1926), the word is literally descriptive of the delicately sculptured skin surface, inclusive of single ridges and their configurational arrangements. Strictly defined, dermatoglyphics does not include the study of creases, wrinkles and cracks beloved of palmists, although these features have subsidiary significance in relation to some dermatoglyphic problems.

Being differentiated in their final form early during the gestation period, these dermal configurations seldom change (except in size), either in structural detail or ridge alignment for the rest of the intrauterine life and thenceforth from birth till death. They, thus enjoy freedom from envirohmental influences in later part of intrauterine life. However, they amply serve as sensitive indicators or may be a reflection of subtle changes in early phase of evolution of the foetus.

There is now ample evidence at hand to show that some characteristics of dermatoglyphics are inherited. The closest possible genetic relationship is that of monozygotic twins. In their dermatoglyphics a high degree

of similarity is noticed. There is, on the other hand, a progressive reduction in degree of similarity in comparison involving lessening relationship. There are differential trends exhibited by these dermal configurations among different individuals, races, constitutional types and between two sexes.

New techniques for detection and diagnosis of diseases are developing at an astonishing rate in present day medicine. Many of these techniques involve highly specialized laboratory procedures with which the clinician has not direct involvement. The development of human cytogenetics since 1960 is an apt example. Concomitant with the existing new findings in cytogenetics there has been a less dramatic awareness of the clinical significance of dermatoglyphics. The study of dermatoglyphics, although amenable to quantitative statistical analysis is, in the first instance, a logical extension of routine physical examinations that is, it falls within the province of the practising pediatricians.

Palm prints and finger prints have long had a fascination for man. The study of dermal ridge patterns of the skin pioneered by Galton(1892) followed by Cummins (1936) has aroused considerable interest since the introduction of chromosome techniques. With markedly developed human cytogenetics and the discovery of chromosomal abnormalities in man, the application of dermato-

glyphics to clinical medicine has proved helpful. when combined with other clinical features of the particular diseases dermatoglyphics can serve to strengthen the diagnostic impression and may be useful as a screening device to select individuals for additional diagnostic studies. It has become well established as an aid in the diagnosis of chromosomal and genetic disorders. However, it is generally accepted that both imherited and environmental factors seem able to cause abnormalities in these skin patterns. Dermatoglyphics as a physical sign deserves more attention by pediatricians than it has been accorded hitherto.

The association of dermatoglyphics and diseases has opened new and vastly interesting diagnostic avenues. It was considered not long back that most useful findings in the study of dermatoglyphics would be in conditions caused by gross chromosomal aberrations. But now it seems reasonable to speculate that abnormal dermatoglyphic findings are associated with a wide spectrum of disease conditions, all of which have in common the fact that the etiologic factors responsible operater in the very early stages of embryogenesis. Dermatoglyphics may serve as marker of a deleterious intrauterine experience during early gestation. Medical dermatoglyphist scrutinizes palm prints for clues to hereditary diseases as it has been observed that definite diagnostic changes are seen in those

disorders which have genetics basis. Recently interest has also developed in establishing association of certain pattern with any disease where etiology is obscure but genetic basis is postulated. It has been seen that dermatoglyphics have been extensitvely studies in a variety of conditions and diseases especially of heredo-familial nature. Dermatoglyphics have many advantages :

1. Dermatoglyphic analysis can be applied readily and easily.
2. Results of analysis are available immediately as a clinical diagnostic tool.
3. Expensive and elaborate pieces of equipments are not required.
4. The procedure is atraumatic.

Bronchial asthma contributes to a leading cause of morbidity in children. Bronchial asthma may be regarded as a diffuse obstructive lung disease with (1) hyperactivity of airways to a variety of stimuli and (2) a high degree of reversibility of the obstructive process, which may occur either spontaneously or as a result of treatment. Hereditary predisposition may be a major factor responsible for the concentration of bronchial asthma in some families. An accurate diagnostic prediction of this predisposition by dermatoglyphics may be of great value.

The association of dermatoglyphics and diseases has opened new and vastly interesting diagnostic avenues.

The central question here is whether a person afflicted with a disease is distinguished from a non diseased by characteristics of dermatoglyphics. If such a distinction should exist, they are of utmost in the analysis of constitution of disease because they demonstrate that susceptibility to the disease, like to distinction in dermatoglyphics, with which it is correlated, is inborn. Obviously for diagnostic aspect of such diseases, those which has their origin early in foetal life and have resulted in a deviation of normal dermatoglyphic findings are of significance. Besides, the genetic and heredo-familial diseases, diseases of acquired origin, like Rubella Syndrome, where the virus of non genetic origin has exerted its deleterious effect on the embryo early in foetal life when dermal configurations were being differentiated are also of equal significance.

In the light of the past attractive scientific work, and presently continued exploring efforts by numerous investigators all over the world to project the dermatoglyphics as a clinical diagnostic tool for a routine physical examination of pediatric patients of, heredofamilial and acquired disorders, it is being endeavoured,, may be a drop in the ocean, to enter the field of patterned traceries.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

HISTORY

The ridge pattern on palms, fingers and soles must have aroused interest even in the ancient times. One of the most telling fragments of this unwritten history is reported to be in the aboriginal Indian carvings found at the edge of Kejimkoojik Lake in Nova Scotia. Within the outline of a human hand, scratches in stone, are lines roughly representing dermatoglyphics. Probably the most famous of ancient "Finger print" designs are carvings on the walls of a Neolithic burial passage, or dolman situated on an island of Brittany, L'lle de Gavr'mis. It is claimed by some workers, notably Stockis and Bridges, that carvings represent dermatoglyphics.

The workers in clay have specially favourable opportunities for observation of skin patterns, impressed in the plastic mass. There is a record of a clear finger print dating to the fourth or fifth century of the Christian era. The fragment of a clay lamp on which it is impressed, was excarvated in Palestine by the late Doctor Bade. There is evidence that finger prints were used for identification more than 2000 years ago in the east. The system of identification by finger prints, had its origin in China where it was in vague for many centuries. The history of China seals begins with the famous seal of emperor Te in she (246-210 B.C.), one one side of which

_____ was the name of the owner, and on the other the impression of his thumb, the latter evidently surving the purpose of identification. The Chenes, though well acquanted with the various patterns found in finger prints did not, however, develop them into system of classification.

Scientific interest in the study of skin ridges aroused as early as later part of 17th century but due to absence of suitable classification, progress in the study was slow. Bidloo (1685) published brief account of the subject in Anatomia Humania corporis. In the year 1986, a comparable description was given by Marcello Malpighi in "De Externo Tactus Organo" who described the morphology of various parts of the palm.

In the 18th and early 19th century an anatomists continued to explore this area. The 18th century was marked by the appearance of several anatomical works in dermatoglyphics by Hintze (1747), Alhimes (1764) and Mayor (1788). Mayor concluded that the arrangement of skin ridges was never the same in the two individuals. Several authors in early 19th century made contribution to the literature on dermatoglyphics. Schroter (1814) in dealing with the sence of touch, presents a discussion of the morphology of the palmar skin and illustrates the arrangement of ridges and pores. The work of Purkinje (1823) is a more important landmark in history, for it was he who first classified systematically the varieties

of patterns of the fingers. He distinguishes "nine principal configurations of rugae and sulci serving the sense of touch on the terminal phalanges of the human hand". Bell (1833) made a searching analysis of the structural adaptation of the hand.

Henry Faulds (1880) published the first item in modern literature relating to finger print identification. Herschel (1880) was the first European of the modern period actually to practice finger print identification.

The latter part of the 19th century is notable for the publications of Henry (1880), Galton (1890) and Veuetich (1892) who with Faulds and Herschel were concerned in developing practical methods of finger print identification. Henry established the scheme of classification which is the most widely adopted of all the numerous systems. The first systemic study, however, was carried out by Francis Galton (1892) around the year 1890. He made a thorough inventory of different kinds of pattern and drew attention to the fundamental formations of arches, loops and whorls. Galton's pioneer work on morphology, classification, inheritence and racial variation of finger prints, is outstanding in the field of dermatoglyphics.

Harris Hawthorne Wilder (1897) studied comparative dermatoglyphics. In the following three decades he continued with studies devoted to morphology, the methodology of plantar and palmar dermatoglyphics, inheritance and radial differences.

The first person, who used "Quantitative value" based on the ridge count, instead of traditional qualitative values of finger prints to determine the inheritance of finger print was Kristine Gonnevil (1924).

Medical interest is of very recent origin. In 1936, Cummins described the peculiar and specific dermatoglyphics in mongoloid patients. This observation antedated the discovery of the chromosome abberration in mongoloid patients by at least two decades.

Penrose (1962) and Vehida et al (1962) described the specific dermatoglyphics abnormalities in trisomy 13 and trisomy 17.

Hold (1968) reported that total ridge count was controlled by cummulative effects of genes and also noted abnormal dermatoglyphics in sex chromosomal disorders. Penrose (1962) believed that total ridge count is an autosomal trait influenced by sex chromosome complements. Neherniah Grew (1984) published the first description of the epidermal ridges which make characteristic patterns on finger tips -"the inumerable little ridges of equal bigness and distance and every where running parallel one with another" contain the pores of sweat glands". He also noted that they were disposed into "eliplicles" and "Triangles".

By far the most advantageous field for biological and medical investigation is that concerned with the topography of the systems of the parallel ridges at the macro-

scopic level - that is as seen fairly easily by the naked eye or with a hand lens with magnification of the two to four diopter. This is called the science of "dermatoglyphics".

Concomittant with the recent developments in human cytogenetics, there has been a growing awareness of the clinical significance of dermatoglyphics in the study of wide variety herdofamilial disorders.

EMBRYOGENESIS OF DERMAL RIDGES

The ridge patterns are found at the sites of a series of foetal mounds situated on the tips of the digits, in the four hypothenar areas of palm and sole and in the calcar areas of soles, (1) These mounds first appear as bulges at about sixth week of embryonic development, when the hands and feet are relatively undifferentiated. (2) During the next four weeks the mounds become rounded and distinctly separated from each other. (3) At about thirteenth week the mould begin to regress slowly, their elevations are reduced and their borders and boundaries become indefinite. At this time the dermal ridges are being formed and the interplay of mould regression and ridge formation produce the various patterns.

The formation of patterns is completed by about eighteenth week and remains unchanged from that time on throughout life except for absolute growth. Although the dermal configuration said to be stable after the fourth

month, disturbances of embryonic growth and development prior to this time may be reflected in abnormal pattern types or frequencies.

TOPOGRAPHY

I. Finger Prints

The finger prints of conventional description is a print of the configuration of the ball of the finger.

A. Whorls (W)

It is distinguished by concentric design. The majority of the ridges make circuits around the core, a pivotal features in the interior of the pattern. It has two tri-radii, one tri radius is on the ulnar and other on the radial side of the pattern.Whorls are of three types symmetrical, spiral and double loop.

B. Loop (L)

The loop is simpler in construction than the whorl. It possesses only one tri-radii. Instead of courring in complete circuits as in the whrol, the ridges curve around only one extremity of the pattern, forming the head of the loop. From the opposite extremity of the pattern, ridges flow to the margin of the digit, this extemity of the pattern is described as open. If the loop opens to the ulnar margin it is an ulnar loop (UL) and if to the radial margin it is an radial loop (RL).

C. Arch (A)

It is formed by a succession of more or less parallel ridges, which traverse the pattern area and form a curve that is concave proximally, and are of two subtypes simple or plain arch and tented arch.

Frequency Distribution of Pattern Types

Holt (1968) observed in a population study of South-easth England, frequencies of pattern types as Whorls -26.1%, Loops - 68.9% (Ulnar 63.5% and Radial 5.4%) and arches - 5.0%. Certain patterns tend to occur more frequently on some digits than on others (Cummins and Midlo, 1926).

TABLE : Distribution of patterns types.

Pattern	Digits (%)						
	Thumb (I)	Index finger (II)	Middle finger (III)	Ring finger (IV)	Little finger (V)	All digits	All digits Galton Types
Ulnar loop	60.89	35.20	74.07	62.27	87.62	64.02	69.72
Radial loop	0.21	24.70	2.52	0.98	0.11	5.69	-
Whorls	35.41	29.47	16.37	34.44	11.42	25.43	25.43
Arches	3.49	10.63	7.30	2.30	0.85	4.86	4.86

II. Palm Prints

For convenience, the palm was divided into six configurational zones as detailed by Wilder (1903). These anatomifally defined areas approximate the site of the

embryonic volar pads and include the thenar area i.e. the mould below the thumb, the hypothenar i.e. the mould on the ulnar side of the palm, and four interdigital zones. Presently the thenar and 1st interdigital areas usually considered together as a single area. These areas may or may not have patterns. A simple inspection of palm shows major thick deep lines on the palm and the interphalangeal joints of the finger. These are known as flexion creases and they represent the location of firmer attachment of the skin to underlying structures.

Palmar Landmarks

The digital and axial tri-radii and the main line traced from the each, constitute important landmarks for dermatoglyphic analysis.

A. Tri-radii

Penrose (1954) defined tri radius as the junction of the three regions each containing system of ridges which are approximately parallel in small fields of these regions.

Theoretically, the three angles between the radiants should measure 120 degree. In practice, this is not always the case, particularly in abnormal subjects. Each angle, however, must be at least 90 degree or no tri-radius is deemed to exist.

Tri-radii are of two subtypes.

1) Digital Tri-radius

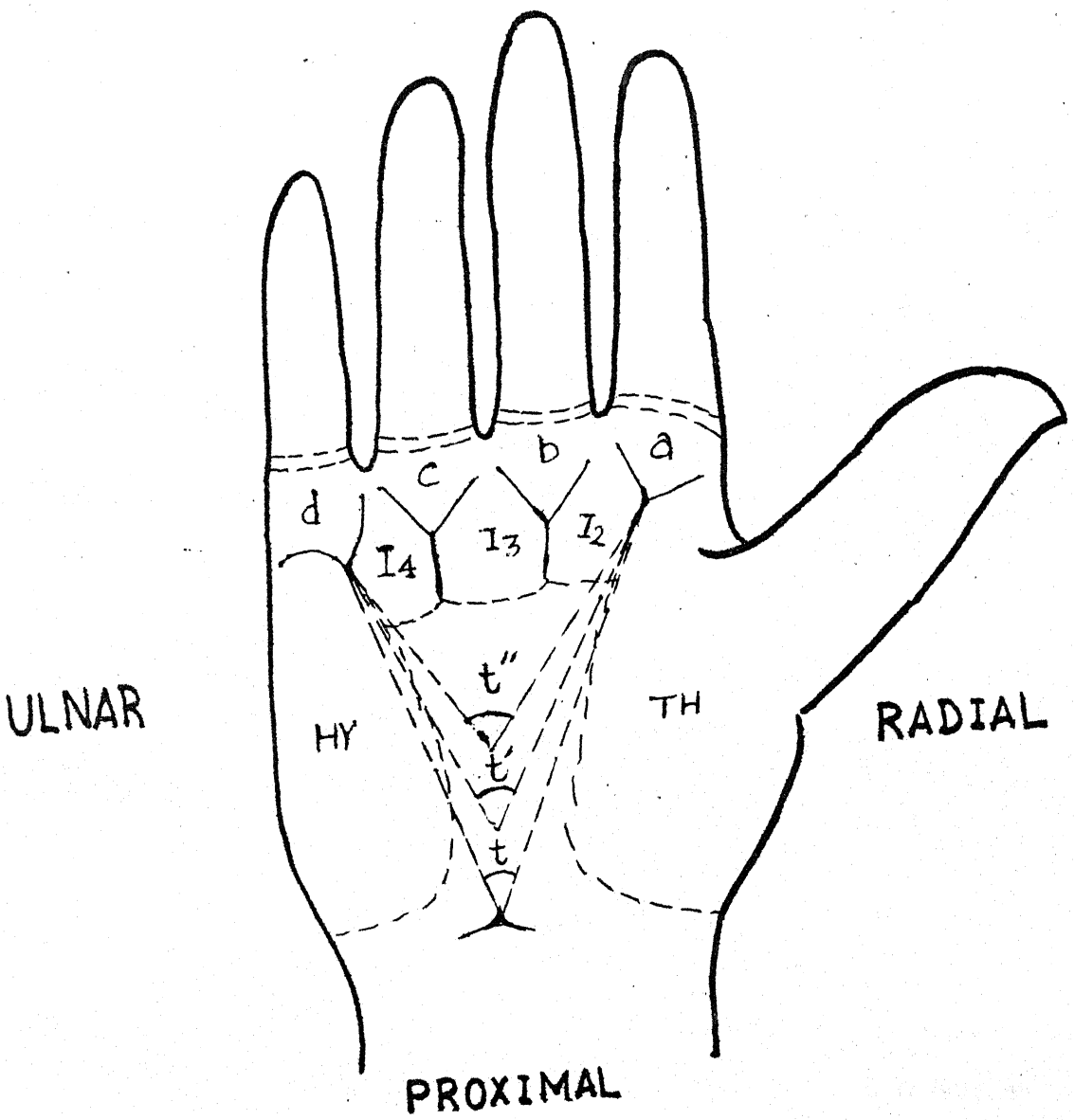
Typically there are four digital tri-radii in

the distal portion of the palm. They are found in the metacarpal region at the base of digits II, III, IV and V. Each tri radii is normally associated with one digit. By convention they are termed as 'a', 'b', 'c' and 'd' proceeding in radio-ulnar direction.

ii) Axial Tri-radius

It is usually found at the base of the palm commonly in the depression between thenar and hypothenar. and very near the proximal palmar margin, superficial to the wrist bones near the axis of the fourth metacarpal bone. The position of this tri-radius is subject to considerable variation, particularly in the proximal distal direction along the axis of the fourth metacarpal bone, and to a lesser extent, in the ulnar radial direction of the axial tri-radius. Not infrequently there is more than one axial tri-radius. If the axial tri-radius is found in the proximal region of the palm, near the wrist crease it is designated as 't' and referred as normal or proximal portion.

If it is situated near the centre of the palm, it is termed as t" and called as distal tri-radius. The intermediate position of the tri-radius between t" & t is symbole red as t' or intermediate tri-radius. An extremely distally placed tri-radius, such as occasionally found distally to the proximal transverse crease, can be termed as t". It tri-radius is shifted towards the radial side it is called as t^r and if shifted towards ulnar side it is



PALM SHOWING DERMATOGLYPHIC PATTERN AREAS. TH, THENAR, HY, HYPOTHENAR; I_1-I_4, FIRST-FOURTH INTERDIGITAL AREAS & atd ANGLE

FIG-3

designated as t^{u}.

III. 'a t d angle'

This angle is formed by lines drawn from the digital tri radius (a) to the axial tri-radius (t) and from this tri-radius to the digital tri-radius (d). The more distal the position of t, the larger the atd angle. In some cases there may be more than one axial tri-radius, in such cases, it has been customary to record the widest atd angle, i.e. the angle emanating from the most distal axial tri-radius. But it has been also suggested that a t d angle originating from each axial tri-radius should be measured. Penrose (1954-1955) advocated that the most radial 'a' tri-radius and the most ulnar 'd' tri-radius should be used as the starting points of measurements.

The numerical values of the a t d angles have been employed in determining the axial tri-radius position i.e. to distinguish between t and t' and t".

Penrose (1954-55) suggested that a t d angle less than 45 degrees as - t, angle between 45-56 degree as t' and angles more than 56 degrees as t".

Kumar et al (1974) , however, considered that atd angle below 43 degree as t, atd angle between 44-56 degree as t' and atd angle more than 56 degree as t".

IV. Ridge counting

The originator of ridge counting as well as the first investigator to attempt the measurement of hereditary likeness in finger print pattern was Galton (1895). He used the method only for the subclassification of loops in personal identification. Henry (1900) incorporated the technique, as applied to the loops, in his system of classification for purpose of identification. In classification and uses of finger prints he gave rules for ridge counting and method was extended by Bannevie (1924) for application of all types of pattern.

Sir Francis Galton (1892) was first to provide the evidence in favour of the pattern types having a hereditary basis, but Wilder (1902, 1904a) was the real pioneer in this branch of dwrmatoglyphics, who suggested that heredity plays an important part in determining ridge arrangements. Later on many researches were carried out and data were analysed for genetical purposes. With few exceptions finger and palm prints have been analysed qualitatively for such characters as pattern type, pattern form of direction, with the intension of determining the method of inheritance in each case. But many researches and investigators could not reach on point of consensus regarding the exact mode of inheritance. It has been observed by Galton (1905) that dermatoglyphic differences exists between the two sides of the body.

Bonnevie (1924) elucidated a new and efficient method of quantifying dermal ridge patterns on fingers for genetic purposes, the method of ridge counting. The total ridge counting of the fingers provided an excellent example of polygenic inheritance. Resemblance between relatives was found to be surprisingly close to the number of genes that an average such relatives have in common.

DERMATOGLYPHICS IN NORMAL INDIAN POPULATION

Mukherjee and Saha (1970) studied the dermatoglyphics in normal Bengalee population in India.

Kumar et al (1974) presented the dermatoglyphic findings in normal healthy North Indian children population. He observed in his series that digital patterns were having many similarities to that of Cummins and Midlo (1943).

Finger print patterns (Kumar et al, 1974).

Pattern	Thumb (I) (%)	Index (II) (%)	Middle (III) (%)	Ring (IV) (%)	Little (V) (%)	All digits (%)	All digits Galton type (%)
Ulnar loop	56.5	48.0	65.3	59.3	74.5	61.2	63.7
Radial loop	3.3	8.8	2.3	1.0	-	2.5	-
Whorls	40.0	34.0	25.0	37.5	23.8	31.9	31.9
Arches	3.3	9.3	5.3	2.3	1.8	4.4	4.4

Position of axial tri-radii - were t = 72.5%, t' = 12.25%, and t" = 10.25

Mean atd angle was 44.5 degree and

Total finger ridge count was 145.2 (Mean value).

UNUSUAL DERMATOGLYPHICS IN MEDICAL DISORDERS

Cummins (1926, 1932) studied dermatoglyphics in cases of polydactyly. The polydactyly can be pre-axial (involving thumb or great toe) central or post axial (towards little finger or toe). In pre-axial polydactyly hereditary tendency is less marked.

Numerous well planned studies have documented a definite constillation of dermatoglyphic aberrations associated with Mongolism. Cummin's (1936, 1939) pioneer work described a cluster of unusual dermatoglyphics of the palms and fingers of mongols. He showed that palm is characterized by a transverse alignment of dermal ridge and the presence of a tri-radius (t") situated at or near the centre. It was found to be 72% in his cases. The characteristic finger pattern type was a high frequency of L-shaped ulnar loops. Whorls and arches were fewer in number, contrary to the usual tendency for the frequency of arches to increase as the frequency of whorls diminishes. Radial loops were also reduced and they chiefly occur on digits, IV, and V in mongols, instead of on digit II. The distal tri-radius is often associated with a large pattern in the hypothenar area.

Penrose (1950) reported a centrally placed tri-radius on both palms in about 75% of mongols, but only in 3.5% of normal population.

Rowe and Uchida (1961) reported distal axial tri-radius in 76% of cases of mongoloid children, but only 60% of those mongols without cardiac malformation.

Hale et al (1961) published the earliest report of features of palmar dermatoglyphics in congenital heart disease. They observed a more distal location (t") of axial palmar tri-radius with higher incidence in patients of congenital heart disease. This observation was later confirmed by Fried and Neel (1962) and Cheistense and Nelson, (1963).

Forney et al (1966) noted a whorl in the third interdigital area of a mother and two daughters with mitral insufficiency and conductive deafness.

Gall et al (1966) reported distally displaced axial tri-radius in cases of Holt Oram syndrome(an autosomal dominant inherited disorder with skeletal and cardiac anomalies).

Alter (1962) reported dermatoglyphics pattern in cases of idiopathic mental retards and observed excess of arches, low finger ridge count, simian line, T/I pattern increased, increased hypothenar pattern and decreased ab ridge count.

Abnormal dermatoglyphics have been reported in children with proved rubella embryopathy, and suggestion was put forward that dermatoglyphics may be a sensitive indicator of even subtle intrauterine rubella damage

(Achs et al, 1966; Alter and Schulenberg, 1966).

Resner et al (1967) reported dermatoglyphic patterns in cases of primary hydrocephalus.

Penrose and Holt (1966) analysed the finger palm and sole prints of an american family with hereditary bradydactyly who have been reported by Hoefragel and Gerald (1966). Varmittage et al (1975) reported dermatoglyphics and palmar flexion creases of 3 persons with bradydactyly.

Desbarroles of Paris (cited by Bose et al, 1992) observed a characteristic chiroglyphic for bronchial asthma and severe throat and bronchial troubles. According to him a transverse loop or island formation crossing the life line is a sign of asthma, and crossed lines on the mount of Mars particularly if deep and forked are suggestive of severe throat and bronchial troubles.

He screened 500 medical students for this chiroglyphic. Fifty of them had this chiroglyphics either in both hands or in the active hand (Group B). An equal number of sex and age matched students without this chiroglyphic pattern or family or personal history of asthma formed group A.

In group B, 78% of students gave a positive family history of asthma or personal history of frequent colds, sneezing or rhinorrhoea. The chiroglyphic pattern in these students correlated well with those of established asthmatics (extrinsic type).

Lung function tests were performed in both the groups. Although the lung function tests in group B were within normal limits, they were significantly lower when compared with group A, indicating hyper-responsiveness of the airway.

Gupta et al (1995) studied 40 patients of bronchial asthma attending G.T.B. Hospital, Delhi. Similarly 40 patients who had no history of bronchial asthma, were chosen as control and finger print patterns were taken of all members of these families. They observed that presence of whorl formation on both the thumbs was a constant feature in all asthma patients and their family members while only 60% thumbs of control family had whorl pattern. Predominance of whorl pattern in most digits was found where members were suffering from bronchial asthma. Their results are given below.

Pattern	Case group	Control group	Row total
Arch	116.0	57.0	173.0
	(4.8%)	(3.1%)	(3.9%)
Loop	885.0	1131.0	2016.0
	(49.2%)	(60.9%)	(53.1%)
Whorl	1829.0	1857.0	1497.0
	(49.0%)	(50.8%)	(40.9%)
Column total	1829.0	1857.0	3686.0
	(49.2%)	(50.8%)	(100.0%)

Chi-Square	d.f.	'p'	E.F.	Cell with EF /5
17.42663	2	0.0002	23.626	None

The above table shows the pattern of arch, loop and whorl in patients of bronchial asthma as compared to

MATERIAL AND METHODS

MATERIAL AND METHODS

FIG-1

MATERIA AND METHODS

The present study was conducted on patients having bronchial asthma, asthmatic bronchitis and bronchiolitis attending the out door clinic of the department of Pediatrics, or admitted in Pediatric ward of M.L.B. Medical College, Hospital, Jhansi during 1994-95.

All subjects selected for the present study belonged to Bundelkhand region and whose parents and grand parents have been living in this very region since birth.

The criteria of selection of the patients and diagnosis were based on careful history, clinical examination, family history and possible relevant investigations. Cases were divided into two group viz. - Group A and Group B. The group A consisted of 40 normal healthy children who acted as controls. The criteria for selection of this group were as follows :

1. Children were not having any family history of heredifamilial disorder and bronchial asthma, asthmatic bronchitis and bronchiolitis.
2. Children were not having any congenital disorder.
3. Children not having bronchial asthma, asthmatic bronchitis and bronchiolitis or any other respiratory illness

Criteria for selection of cases of group B were as follows :

1. Cases were not having any family history of heredofamilial disorders.
2. Cases were not having any other respiratory illness.

Children having chest deformities which could compromise cardiorespiratory functions were excluded from both the groups. Group B consisted of 60 cases.

Group B was further divided in three groups : Group I consisted of 20 cases of bronchial asthma. Group II consisted of 20 cases of asthmatic bronchitis, and Group III consisted of 20 cases of bronchiolitis.

The children selected for the control group also belonged to Bundelkhand region and their parents and grand parents also were originally from the same region.

For obtaining the finger and palm prints the Cotterman's (1951) India Ink technique was utilized. The necessary equipments consisted of printer's ink, a roller, two smooth glass slabs, slightly glazed white paper of good quality and the magnifying hand lens.

In the process of taking the prints, the patient's both the hands were initially washed with soap and water and left to dry. Then a small daub of printer's ink was placed on the inking glass slab and was spreaded with the roller to form a thin and even film. The hands were then placed on the inked surface gently after

ensuring that the ink has spreaded evenly over the palm and fingers. For getting the impression both the hands were then placed on the sheet of the plain white glazed paper kept on another smooth glass slab. Finally the hands were removed and print was left to dry. The prints of fingers were also taken separately by rolling the individual fingers from edge to edge on the recording paper after getting each finger inked on the inking glass slab. The palm and finger prints, thus obtained were studied with naked eye examination initially and thereafter with magnifying lens of 10 diopter.

The dermatoglyphic analysis of the rpints was carried out under following headings and ridge count was done by Bonnovie (1924) technique :

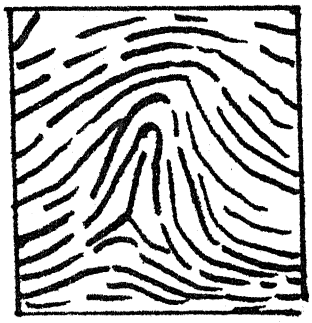
1. Finger print patterns :
   (a) Whorls, (b) Loops (c) Arches.
2. The presence and position of axial tri.radii.
3. a t d angle.
4. Individual finger ridge count and
5. Total finger ridge count.

RIDGE COUNTING

It was carried out as follows :

a. From tri-radial point to point of core.
b. From a traced radiant to a tri-radial point.
c. Along a one centimeter line placed at right angles of ridges. The ridge count consisted of the number of ridges which cut or touch a straight line running

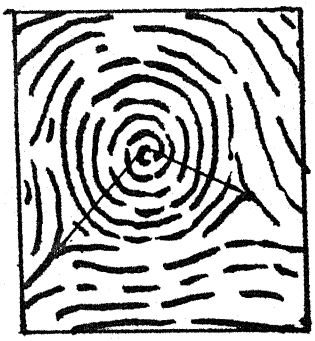
SIMPLE ARCH



TENTED ARCH

LOOP

WHORL
(SYMMETRICAL)



WHORL
(SPIRAL)

WHORL
(DOUBLE LOOP)

RIDGE IN VARIOUS FINGER TIP PATTERN TYPES. THE COUNTING IS DONE ALONG THE STRAIGHT LINES CONNECTING THE CORE AND TRI-RADIUS

FIG-2

measure of pattern size. After locating the tri-radial point and point of core, as outer or inner terminal of the count, the line was set in position to connect them. The tri-radial point and point of core were not included in the count.

TOTAL FINGER RIDGE COUNT (TFRC)

It represents the sum of the ridge counts of all the tem fingers. Only the larger count was used in those digits which had more than one ridge count.

ABSOLUTE FINGER RIDGE COUNT (AFRC)

It is the sum of the ridge counts from all the separate tri-radii on the fingers.

On hands where no whorls were detected, the TFRC and AFRC were the same except in few rare cases. The TFRC expresses the size of the pattern, whereas the AFRC reflects the pattern size as well as the pattern intensity, which depends on the pattern type. Using the AFRC, loops may have a similar or equal ridge count.

The data thus obtained were statistically analysed.

O B S E R V A T I O N S

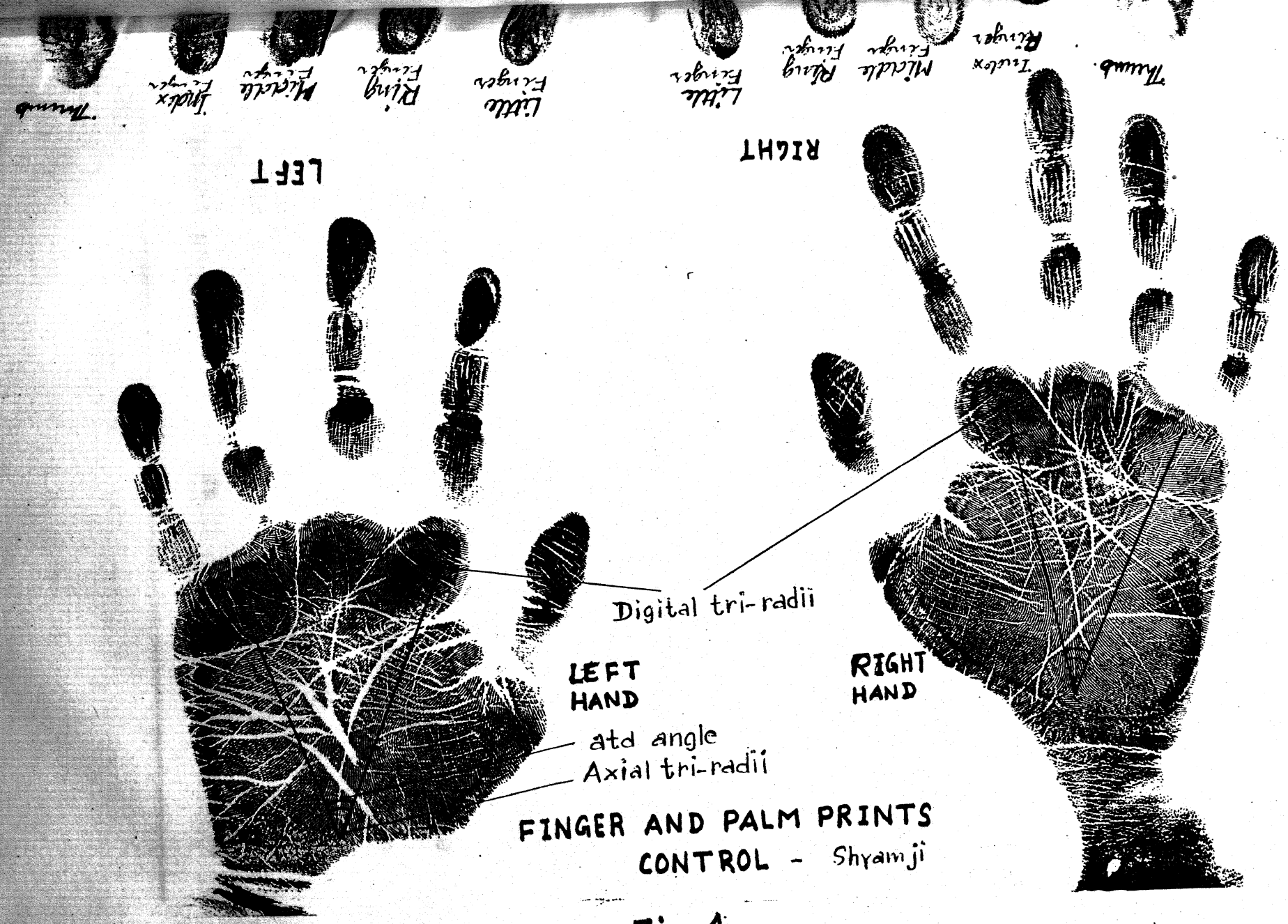

LEFT
RIGHT
Digital tri-radii
LEFT
HAND
RIGHT
HAND
atd angle
Axial tri-radii
FINGER AND PALM PRINTS
CONTROL - Shyamji

Fig-4

O B S E R V A T I O N S

The present study was carried out on twenty patients each of bronchial asthma, asthmatic bronchitis and bronchiolitis of pediatric age group. Forty Normal healthy children were selected to serve as control. As such a total of 200 palms/1000 finger prints were subjected to dermatoglyphic study.

YABLE I : Sexwise distribution of cases of study and control groups.

Groups	Male	Female	Total	
			Number	Percentage
Study group :	50	10	60	60.00
1. Bronchial asthma	16	4	20	20.00
2. Asthmatic bronchitis	17	3	20	20.00
3. Bronchiolitis	17	3	20	20.00
Control group :	29	11	40	40.00

FINGER TIP PRINT PATTERNS

The distribution of dermatoglyphic finger tip print patterns in cases of bronchial asthma is divulged in table II. It was observed that whorls were predominant (56.5%) followed by loops (42.5%) and arches (1.0%). When the study group was compared with the control group (Table II) the difference was statistically highly significant for whorls and significant for loops and arches.

In cases of asthmatic bronchitis (Table III), it was observed that loops were predominating (67%) followed by whorls (22.5%) and arches (10.5%). When the study group was compared with control group (Table III), the diference was statistically highly significant for whorls and loops. The difference was statistically insignificant for arches.

Finger tip print patterns in cases of bronchiolitis (Table IV) showed that loops were predominant(62%) followed by whorls (25%) and arches (13.0%).

Statistical analysis showed that whorls were insignificant in bronchiolitis as compared to controls, whereas the difference was significant for loops and arches (Table IV).

TABLE II : Dermatoglyphic finger tip print patterns in bronchial asthma (n=20) and controls (N=40).

Pattern	Right hand		Left hand		Right and left hand combined		Statistical significance	
	Study group	Control group	Study group	Control group	study group	Control group	't' value	p value
Whorl	59 (59.0)	72 (36.0)	54 (54.0)	71 (35.5)	113 (56.5)	143 (35.7)	6.45	<0.01**
Loop	40 (40.0)	104 (52.0)	45 (45.0)	120 (60.0)	85 (42.5)	224 (56.0)	4.84	<0.05*
Arch	1 (1.0)	24 (12.0)	1 (1.0)	19 (9.5)	2 (1.0)	43 (10.32)	3.46	<0.05*

Figures in parantheses indicate the percentage values.

* Significant

** Highly significant.

TABLE III : Dermatoglyphic finger tip print patterns in Asthmatic bronchitis (n=20) and controls (n=40).

Patterns	Right hand		Left hand		Right and left hand combined		Statistical significance	
	Study group	Control group	Study group	Control group	Study group	Control group	t value	p value
Whorl	22 (22.0)	72 (36.0)	23 (23.0)	71 (35.5)	45 (22.5)	143 (35.7)	3.55	<0.01**
Loop	69 (69.0)	104 (52.0)	65 (65.0)	110 (55.0)	134 (67.0)	214 (53.5)	13.35	<0.01**
Arch	9 (9.0)	24 (12.0)	12 (12.0)	19 (9.5)	21 (10.5)	43 (10.75)	0.13	>0.5*

Figures in parantheses indicate the percentage values.

* Insignificant. ** Significant.

TABLE IV : Dermatoglyphic finger tip print patterns in bronchiolitis (n=20) and controls (n=40).

Patterns	Right hand		Left hand		Right and left hand combined		Statistical significance	
	Study group	Control group	Study group	Control group	Study group	Control group	t value	p value
Whorl	25 (25.0)	72 (36.0)	29 (29.0)	71 (35.5)	54 (27.0)	143 (35.75)	0.43	>0.5*
Loop	62 (62.0)	104 (52.0)	64 (64.0)	110 (55.0)	126 (63.0)	214 (53.5)	2.05	<0.05**
Arch	13 (13.0)	24 (12.0)	7 (7.0)	19 (9.5)	20 (10.0)	43 10.75)	2.43	<0.05**

Figures in parantheses indicate the percentage value.

* Insignificant ** Significant

POSITION OF AXIAL TRI-RADII

The distribution according to the position of axial tri-radii in cases of bronchial asthma is presented in table V. It was observed from the table V that t position was predominant followed by t' and t".

When compared with the control group, the difference was statistically insignificant for t, t' and t".

Table VI shows the distribution according to the position of axia tri-radii in asthmatic bronchitis. It was observed that t position was predominant followed by t' and t". The difference was insignificant when compared with control group.

Table VII shows the distribution according to the position of axial tri-radii in bronchiolitis. It was observed that t position was predominant followed by t' and t".

When study group was compared with the control group (Table VII) the difference was statistically significant for t and insignificant for t' and t".

TABLE V : Position of axial tri-radii in bronchial asthma (n=20) and controls (n=40).

Position of axial tri-radii	Right hand		Left hand		Right and left hand combined		Statistical significance	
	Study group	Control group	Study group	Control group	Study group	Control group	t value	p value
t	11	30	11	30	22	60	1.12	>0.05*
t'	5	7	5	7	10	14	1.15	>0.05*
t"	4	3	4	3	8	6	1.22	>0.05*

* Not significant.

TABLE VI : Position of axial tri-radii in Asthmatic Bronchitis (n=20) and controls (n=40).

Position of axial tri-radii	Right hand		Left hand		Right and left hand combined		Statistical significance	
	Study group	Control group	Study group	Control group	Study group	Control group	t value	p value
t	12	30	12	30	24	60	0.80	$>0.05^{*}$
t'	5	7	5	7	10	14	0.80	$>0.05^{*}$
t"	3	3	3	3	6	6	0.68	$>0.05^{*}$

* Not significant.

TABLE VII : Position of axial tri-radii in bronchiolitis (n=20) and controls (n=40).

Position of axial tri-radii	Right hand		Left hand		Right and left hand combined		Statistical significance	
	Study group	Control group	Study group	Control group	Study group	Control group	t value	p value
t	14	30	14	30	28	60	0.166	70.5*
t'	4	7	4	7	8	14	0.40	70.5*
t"	2	3	2	3	4	6	0.33	70.5*

* Not significant.

atd ANGLE

The mean value of atd angle in cases of bronchial asthma, asthmatic bronchitis and bronchiolitis have been shown in table VIII. It was observed that the mean value of atd angle in control group was 42.60 ± 5.46 degrees. It was 45.30 ± 5.84 degrees in bronchial asthma, 44.4 ± 7.68 degrees in asthmatic bronchitis and 50.50 ± 9.82 degrees in bornchiolitis.

When the study groups were compared with control group, the difference was stiatistically significant for bronchial asthma, insignificant for asthmatic bronchitis and high significant for bronchiolitis. (Table VIII).

TOTAL FINGER RIDGE COUNT (TFRC)

The mean values of total finger ridge count in bronchial asthma, asthmatic bronchitis and bronchiolitis and in control group are shown in table IX.

It was observed that the mean value of total finger ridge count in control group was found to be 136.1±9.59, in bronchial asthma 146.9±12.95, in asthmatic bronchitis 154.3±18.13 and in bronchiolitis 140.5±11.22. When study groups were compared with the control group, the difference was statistically high significant for bronchial asthma and asthmatic bronchitis and significant for bronchiolitis.(Table IX).

TABLE VIII : Mean value of atd angle (in degrees) in bronchial asthma(n=20), asthmatic bronchitis(n=20), bronchiolitis(n=20) and controls (n=40).

Disease	Study group Mean±S.D.	Control group Mean±S.D.	Statistical significance 't' value	p value
Bronchial asthma	45.30±5.84	42.60±5.46	2.25	<0.05*
Asthmatic bronchitis	44.40±7.68	42.60±5.46	1.47	<0.05*
Bronchiolitis	50.50±9.82	42.60±5.46	6.32	<0.01**

* Significant ** highly significant

TABLE IX : Total finger ridge count (TFRC) in bronchial asthma(n=20), asthmatic bronchitis(n=20) and bronchiolitis (n=20) and controls (n=40).

Disease	Study group Mean±S.D.	Control group Mean±S.D.	Statistical Significance 't' value	p value
Bronchial asthma	148.9±12.95	136.1±9.59	3.74	<0.01*
Asthmatic bronchitis	154.3±18.13	136.1±9.59	5.44	<0.01*
Bronchiolitis	140.5±11.22	136.1±9.59	1.61	>0.5**

* Highly significant ** Not significant.

ABSOLUTE FINGER RIDGE COUNT

The mean values of absolute finger ridge count (AFRC) in bronchial asthma, asthmatic bronchitis and bronchiolitis and in normal control group are depicted in table X.

It was observed from the table X that the mean value of absolute finger ridge count in normal control group was found to be 161.87±12.43. In bronchial asthma it was 177.95±13.82, in asthmatic bronchitis 153.25±11.50 and in bronchiolitis 158.7 ±12.74.

When study group was compared with control group, the difference was statistically highly significant for bronchial asthma and asthmatic bronchitis and insignificant for bronchiolitis.

TABLE X : Absolute finger ridge count in bronchial asthma(n=20), asthmatic bronchitis(n=20), bronchiolitis(n=20) and controls (n=40).

Disease	Study group Mean±S.D.	Control group Mean±S.D.	Statistical significance 't' value	p value
Bronchial asthma	177.95±13.82	161.87±12.43	4.63	<0.01*
Asthmatic bronchitis	157.25±11.50	161.87±12.43	2.63	<0.01*
Bronchiolitis	158.7±12.74	161.87±12.43	0.93	>0.5**

* Highly significant ** Not significant

TABLE XI : Comparative dermatoglyphics in bronchial asthma and asthmatic bronchitis.

Dermatoglyphic parameters	Bronchial asthma	Asthmatic bronchitis	Statistical significance 't' value	p value
Finger tip print patterns				
Whorl	56.5%	22.5%	6.49	<0.01*
Loop	42.5%	67.0%	7.03	<0.01*
Arches	1.0%	10.5%	3.19	<0.05**
atd angle(in degrees - mean±S.D.)	45.30±5.84	44.40±7.68	0.41	>0.5***
Total finger ridge count (mean±A.D.)	149.9±12.85	154.3±18.13	1.48	>0.05***
Absolute finger ridge count (mean± S.D.)	177.95±12.82	157.25±11.50	6.09	<0.01*

* Highly significant, ** Significant, *** Not significant

TABLE XII : Comparative dermatoglyphics in bronchial asthma and bronchiolitis.

Dermatoglyphic parameters	Bronchial asthma	Bronchiolitis	Statistical significance 't' value	Statistical significance p value
Finger tip print patterns				
Whorl	56.5%	27.0%	0.85	>0.05*
Loop	42.5%	63.0%	4.67	<0.01**
Arch	1.0%	10.0%	0.29	>0.5
atd angle (in degrees - mean$\pm$S.D.)	45.30$\pm$5.84	50.50$\pm$9.82	2.08	<0.05*
Total finger ridge count (Mean$\pm$S.D.)	149.9$\pm$12.95	140.5$\pm$11.22	1.68	>0.05***
Absolute finger ridge count (Mean$\pm$S.D.)	177.95$\pm$13.82	158.7$\pm$12.74	4.54	<0.01**

* Significant

** highly significant

*** Not significant

TABLE XIII : Comparative dermatoglyphics in asthmatic bronchitis and bronchiolitis.

Dermatoglyphic parameters	Asthmatic bronchitis	Bronchiolitis	Statistical significance 't' value	Statistical significance p value
Finger tip print patterns				
Whorls	22.5%	27.0%	0.32	>0.5*
Loops	67.0%	63.0%	1.37	>0.05*
Arches	10.5%	10.0%	2.15	<0.05**
atd angle(in degrees - mean±S.D.)	44.40±7.68	50.50±9.82	2.17	<0.05**
Total finger ridge count (mean±S.D.)	154.3±18.13	140.5±11.22	2.94	<0.05**
Absolute finger ridge count (Mean±S.D.)	157.25±11.50	158.7±12.74	1.40	>0.05*

* Not significant

** significant.

TABLE XIV : Finger tip print patterns in bronchial asthma (n=20) and controls (n=40).

Finger	Patterns	Study group	Control group	Statistical significance 't' value	p value
Right hand					
Thumb	Whorl	17	14	4.55	<0.001
	Loop	3	18	3.75	<0.001
	Arch	0	8	1.666	>0.05
Index	Whorl	11	12	1.128	>0.05
	Loop	9	26	1.307	>0.05
	Arch	0	2	0.221	>0.5
Middle	Whorl	10	16	0.735	>0.05
	Loop	10	24	0.735	>0.05
	Arch	0	0	-	>0.5
Ring	Whorl	12	12	1.119	>0.05
	Loop	8	19	0.556	>0.5
	Arch	0	3	0.289	>0.5
Little	Whorl	8	13	0.567	>0.5
	Loop	1	18	4.319	<0.001
	Arch	1	9	0.292	>0.5
Left hand					
Thumb	Whorl	16	12	4.387	<0.001
	Loop	4	15	1.495	>0.05
	Arch	0	13	1.003	>0.05
Index	Whorl	9	7	2.1825	<0.05
	Loop	11	28	1.130	>0.05
	Arch	0	5	0.545	>0.5
Middle	Whorl	12	12	2.290	<0.05
	Loop	8	24	1.492	>0.05
	Arch	0	4	0.438	>0.5
Ring	Whorl	10	17	0.551	>0.5
	Loop	10	17	0.551	>0.5
	Arch	0	6	0.649	>0.5
Little	Whorl	6	16	0.771	>0.05
	Loop	13	24	0.378	>0.5
	Arch	1	0	3.773	<0.001

TABLE XV : Finger tip print patterns in asthmatic bronchitis(n=20) and controls (n=40).

Finger	Patterns	Study group	Control group	Statistical significance 't' value	p value
Right hand					
Thumb	Whorl	7	14	-	>0.5
	Loop	10	14	0.367	>0.5
	Arch	3	8	2.25	<0.05
Index	Whorl	2	12	6.06	<0.001
	Loop	16	26	1.153	>0.05
	Arch	2	2	0.667	>0.5
Middle	Whorl	5	16	1.36	>0.05
	Loop	13	24	0.379	>0.5
	Arch	2	0	2.08	<0.05
Ring	Whorl	5	18	1.667	>0.05
	Loop	15	19	2.2	<0.05
	Arch	0	3	0.289	>0.5
Little	Whorl	3	13	1.608	>0.05
	Loop	15	18	2.4	<0.05
	Arch	2	9	0.218	>0.5
Left hand					
Thumb	Whorl	8	12	3.816	<0.001
	Loop	10	15	0.925	>0.05
	Arch	2	13	0.924	>0.05
Index	Whorl	5	7	0.658	>0.5
	Loop	13	28	0.3878	>0.5
	Arch	2	5	0.294	>0.5
Middle	Whorl	4	12	0.869	>0.05
	Loop	14	24	0.781	>0.05
	Arch	2	4	0	>0.5
Ring	Whorl	3	17	2.477	<0.05
	Loop	13	17	1.704	>0.05
	Arch	4	6	0.472	>0.5
Little	Whorl	3	16	2.252	<0.05
	Loop	17	24	2.252	<0.05
	Arch	0	0	0	>0.5

TABLE XVI : Finger tip print patterns in bronchiolitis (n=20) and controls (n=40).

Finger	Patterns	Study group	Control group	Statistical significance 't' value	p value
Right hand					
Thumb	Whorl	6	14	0.393	>0.5
	Loop	10	18	0.367	>0.5
	Arch	4	8	1.694	>0.05
Index	Whorl	6	12	0	>0.5
	Loop	14	26	3.401	<0.001
	Arch	0	2	0.221	>0.5
Middle	Whorl	2	16	0	>0.5
	Loop	8	24	0.735	>0.05
	Arch	10	0	0.581	>0.5
Ring	Whorl	4	18	2.118	<0.05
	Loop	14	19	1.744	>0.05
	Arch	2	3	1.89	>0.05
Little	Whorl	5	13	0.615	>0.5
	Loop	13	18	1.504	>0.05
	Arch	2	9	0.218	>0.5
Left hand					
Thumb	Whorl	10	12	1.504	>0.05
	Loop	9	15	0.555	>0.5
	Arch	1	13	0.859	>0.05
Index	Whorl	3	7	0.250	>0.5
	Loop	16	28	0.953	>0.05
	Arch	1	5	3.820	<0.001
Middle	Whorl	6	12	0	>0.5
	Loop	14	24	0.781	>0.05
	Arch	0	4	0.438	>0.5
Ring	Whorl	6	17	1.164	>0.05
	Loop	13	17	1.704	>0.05
	Arch	1	6	1.338	>0.05
Little	Whorl	3	16	2.252	<0.05
	Loop	14	24	0.781	>0.05
	Arch	3	0	0.847	>0.05

D I S C U S S I O N

DISCUSSION

Dermatoglyphics, which literally embraces the study of patterned traceries of five epidermal ridges of finger, palms and soles, must have aroused interest even in the ancient times. Being differentiated in the final form early during the gestation period, these dermal configurations seldom show any change (except in size), either in structural detail or ridge alignment for the rest of the intrauterine life and thenceforth from birth till death. They, thus, enjoy freedom from environmental influences in the later part of intrauterine life. However, they amply serve as sensitive indicators or may be a reflection of subtle changes in early phase of evolution of the foetus.

Recently the scope of dermatoglyphics has been amply recognition as having broader limits, with expending horizons of medical biology, in explaining certain diagnostic, aetiological and aetiopathological riddles in various diseases, especially with heredofamilial background.

The association of dermatoglyphics and diseases has opened new and vastly interesting diagnostic avenues. The stirring and stimulating ideas and facts proved catalyst to the present study of dermatoglyphics in children with bronchial asthma, asthmatic bronchitis and bronchiolitis, which was undertaken to contemplate the

possible peculiarities of fine dermal ridges and to screen the characteristic unusual dermatoglyphic patterns which may prove as an helpful aid in the routine physical examination.

The present study of dermatoglyphics in children has been carried out in 60 pediatric patients, 20 each of bronchial asthma, asthmatic bronchitis and bronchiolitis in the department of Pediatrics, M.L.B. Medical College, Hospital, Jhansi for the period of one year during the session 1994-95.

Total 120 palms/600 fingers prints in the pediatric patients with bronchial asthma, asthmatic bronchitis and bronchiolitis and 80 palms/400 fingers prints of the 40 normal healthy children for the control group were subjected to the study of dermatoglyphics.

Finger tip print patterns, position of axial tri-radii, mean atd angle, total finger ridge count were studied.

Kumar et al (1972) studied normal healthy Indian children and reported the predominance of loop pattern(64%) followed by whorls (31.9%) and arches (4.3%) when both the hands were considered (Table I). They reported the predominance of whorl pattern on thumb (40%) and index finger(40%), predominance of loops on middle finger and predominance of arches on index finger.

Kumar et al (1974) observed the various dermatoglyphic parameters in normal healthy north Indian children

TABLE 1 : Comparative dermatoglyphics in normal healthy individuals.

Author	Finger tip print pattern (combined) (%)				Finger tip print pattern on individual finger (%)					atd angle (Mean)	TFRC (Mean)	AFRC (Mean)
	W	L	A		T	I	M	R	L			
Kumar et al, 1972	31.9	64.0	4.3	W	40.0	40.0	25.0	37.0	23.0			
				L	56.75	56.5	69.25	60.0	74.0	-	-	-
				A	3.0	9.0	5.0	3.0	2.0			
Kumar et al, 1974	31.9	63.7	4.4	W	40.0	34.0	25.0	31.5	23.8			
				L	59.8	56.6	67.6	60.3	74.5	44.5°	142.2	-
				A	3.3	9.3	5.3	2.3	1.8			
Reddy et al 1976	34.6	63.1	4.3	W	35.0	43.0	31.0	61.0	19.0			
				L	63.0	49.0	65.0	37.0	80.0			
				A	2.0	8.0	4.0	2.0	1.0			
Magotra et al 1976	-	-	-	W	43.5	36.5	24.5	46.6	30.0			
				L	53.5	51.5	74.0	50.5	68.5	-	-	-
				A	3.0	12.0	1.5	4.5	1.5			
Ravinder et al 1978	44.8	47.7	7.9							44.84°	109	-
Present study (Controls)	27.0	63.0	10.0	W	33.75	23.7	35.0	43.7	36.3			
				L	41.25	67.5	60.0	45.0	52.5	42.6°	136.1	161.9
				A	26.00	0.8	5.0	11.3	11.2			

W = Whorl, L = Loop, A = Arch, T = Thumb, I = Index finger, M = Middle finger, R = Ring finger , L = Little finger.

TFRC = Total finger ridge count, AFRC = Absolute finger ridge count.

and also reported the predominance of loops (63.7%) followed by whorls (31.9%) and arches when the individual finger pattern was considered, they reported predominance of whorls on thumb (40%), predominance of loops on little finger and predominance of arches on index finger (9%).

Reddy et al (1976) also observed the predominance of loops (63.1%) followed by whorls (34.6%) and arches(4.3%) in normal healthy children of Hyderabad (Table I). When individual finger pattern was considered, they, however, observed predominance of whorls on index finger (61%), of loops on little finger (80%) and predominance of arches (8%) on index finger (Table I).

Magotra et al (1976) have mentioned the individual finger patterns in normal healthy individuals of Maharashtra. They observed that the whorl pattern was predominant on ring finger (46.6%) the loops were predominant on middle finger (74%) and arches were on index finger (12%) (Table I).

Ravinder et al (1978) reported the predominance of loops (47.7%) followed by whorls (44.8%) and arches (7.9%) in healthy children of Andhra Pradesh (Table I).

In the present study also the loop pattern was predominant (53.5%) followed by whorls (35.75%) and arches (10.75%) in control group. When the individual finger print pattern was considered, it was observed that the whorls predominated on ring finger (40.4%). The loop pattern was in predominance on index finger (60.75%) and

the arch pattern was found predominantly on thumb(20.6%) (Table I).

From the above studies of finger print patterns from different part of country, it is obvious when fingers of both hands were considered together, loop pattern is the commonest and arch pattern is least common. However, as far as individual finger print pattern is concerned there is no unanimity on the pattern of different fingers.

Kumar et al (1974) observed the predominant position of axial tri-radii as t (72.5%) followed by t' (17.25%) and t" (10.25%). In the present study also the predominant position of axial tri-radii was found to be at t (75%) followed by t' (17.5%) and t" (7.5%) as the least common.

Kumar et al (1974) reported the mean atd angle as 44.5° in normal healthy north Indian children.

Ravinder et al have reported the mean atd angle to be 44.84° in normal children of Andhra Pradesh.

In the present study the mean atd angle was found to be 42.6° in controls which was at par with the previous workers.

The mean of total finger ridge count was found to be 106.4% by Ravinder et al (1978). Kumar et al (1974) however, reported the mean total finger ridge count to be 145.2 % which is quite higher than the previous study.

In the present study in control group the total finger ridge count was found to be 136.59.

The mean absolute finger ridge count in the present study was 161.87. We could not find the data about the absolute finger ridge count in Indian children.

Bronchial Asthma

We could find only one study (Gupta et al, 1995) on dermatoglyphic pattern in bronchial asthma.

Gupta et al (1995) reported the preponderance of whorl pattern in cases of bronchial asthma when both the hands were considered. They reported the presence of whorl pattern on thumbs of both the hands as a contant feature in all the cases of bronchial asthma ($p < 0.002$).

TABLE 2 : Showing pattern of arch, loop and whorl in patients of bronchial asthma as compared to controls.

Pattern	Study group	Control group	Row total
Arch	116.0 (4.8%)	57.0 (3.1%)	173.0 (3.9%)
Loop	885.0 (49.2%)	1131.0 (60.9%)	2016.0 (55.1%)
Whorl	1829.0 (49.0%)	1857.0 (50.8%)	1497.0 (40.9%)
Column total	1829.0 (49.2%)	1857.0 (50.8%)	3686.0 (100.0%)

Chi-square	: 17:42663	Min.	23.626
d.f.	: 2	EF cells with EF < 5	None
Significance	: 0.0002		

In the present study also the whorl pattern was significantly higher ($p < 0.001$) in bronchial asthma as compared to control group. The presence of significant whorl pattern predominantly on thumb was also observed in the present study ($p < 0.001$), but it was observed on both the thumbs in only 80% of the cases.

In asthmatic individuals where whorl pattern was absent on thumb only loop pattern was seen. It was significant to note that arch pattern was absent on both the thumbs of cases of bronchial asthma. However, the presence of arch pattern on little finger of right hand was found to be significant ($p < 0.001$).

We could not trace any literature about the position of axial tri-radii, atd angle, total finger ridge count and absolute finger ridge count in bronchial asthma.

In the present study, the position of axial tri-radii in bronchial asthma patients (Table V) was found to be statistically insignificant when compared to control.

However, the mean atd angle was significantly ($p < 0.05$) wider (45.30 ± 5.84) as compared to control indicating the upward shift of axial tri-radii t.

The total finger ridge count was significantly higher ($p < 0.01$) in cases of bronchial asthma as compared to controls.

Similarly the absolute finger ridge count was also significantly higher ($p < 0.01$).

Asthmatic Bronchitis

To the best of our knowledge no literature is available on the dermatoglyphics in asthmatic bronchitis.

When combined finger print pattern was considered it was found in the present study that the incidence of loops (67%) was significantly higher ($p < 0.01$) and whorls were significantly less ($p < 0.01$) and whorls were significantly less ($p < 0.01$) than controls. The difference in arches from controls was insignificant.

When individual finger print pattern was considered then it was found that the arch pattern on thumb and index finger of right hand was significantly lower than control ($p < 0.05$ and $p < 0.001$ respectively.) The arches on middle finger of right hand were found to be significantly ($p < 0.05$) higher in disease group. The presence of loops on ring and little finger of right hand was statistically significant ($p < 0.05$). The number of whorls on thumb of left hand was significant ($p < 0.001$).

There was no significant difference in the position of axial tri-radii and atd angle in study and control groups.

The total finger ridge count (154.3 ± 18.13) and absolute finger ridge count (157.25 ± 11.50) was found to be significantly higher in asthmatic bronchitis patients as compared to the controls.

Bronchiolitis

The present endeavour on bronchiolitis patients revealed higher incidence of loops and low incidence of arches on both the hands when compared with the control. The difference was found to be statistically significant ($p < 0.05$). The worls were found to be less (27%) in comparison to the control (35.75%) but the difference was found to be statistically insignificant.

When the individual finger print pattern was considered, it was observed that there was predominance of loops on index finger of right hand which was statistically significant ($p < 0.001$). Whorls on ring finger of right hand was also found to be significantly less than controls ($p < 0.05$).

The position of axial tri-radii did not differ significantly in control and study groups however the atd angle was obviously wider (50.50 ± 9.82) than the control (42.60 ± 5.46) and the difference was statistically highly significant ($p < 0.001$).

The total finger ridge count was higher (140.5 ± 11.22) as compared to the control (136.1 ± 9.59) but the difference was statistically insignificant.

The absolute finger ridge count was found to be less (158.7 ± 12.72) as compared to the control (161.87 ± 12.43) but the difference was statistically insignificant ($p > 0.5$).

S U M M A R Y

S U M M A R Y

Study of patterned traceries of fine epidermal ridges of finger, palms and soles, pioneered by Galton (1892) and followed by Cummins (1936) and others, has opened a new and vastly interesting diagnostic avenues in the practice of medicine.

Since 1926, when the word dermatoglyphics was first proposed by Cummins and Midlo, the science of patterned traceries has been extensively studied in wide spectrum of disease conditions especially of heredofamilial nature. Many chromosomal and non chromosomal prenatally determined medical disorders have been found to be having close association with dermatoglyphic patterns, which is not only primarily genetically determined, but also provide an indirect, indelible, historical perspective of the form of the early fetal hand.

Since the dermatoglyphics has been helpful in explaining certain diagnostic, aetiological and etiopathological riddles in various diseases especially with heredofamilial background, it was endeavoured to study the dermatoglyphics in bronchial asthma, asthmatic bronchitis, and bronchiolitis in children to screen the possible unusual dermatoglyphic findings which can prove as an helpful aid in the routine physical examination of child population by the practicing paediatricians.

The present study of dermatoglyphics in children with bronchial asthma, asthmatic bronchitis and bronchiolitis was carried out in the department of Pediatrics, M.L.B. Medical College, Jhansi in total 100 subjects, comprising 200 palms and 1000 finger prints, which included 20 patients each of bronchial asthma, asthmatic bronchitis and bronchiolitis encountered in the paediatric outdoor patients department or indoor ward and 40 healthy normal children of Bundelkhand region.

In the process of obtaining the finger and palm prints Cotterman's India ink technique was utilized and prints obtained therein were initially analysed by naked eye examination and thereafter by the magnifying lens of 10 diopter. The following five dermatoglyphic parameters were accounted in the present study.

1. Finger tip print patterns (whorls, loops and arches).
2. Position of axial tri-radii (t, t', and t").
3. atd angle.
4. Total finger ridge count (T.F.R.C.).
5. Absolute finger ridge count (A.F.R.C.).

In the control group the loop pattern was predominant and the arches were least common. The whorl pattern was found predominantly on ring finger. The loop pattern was in predominance on index finger and the arch pattern was found predominantly on thumb.

In control group the mean atd angle was found to be 42.6°. The mean total finger ridge count was

136.1. The mean absolute finger ridge count was found to be 161.87. The predominant position of axial tri-radii was t and t" was the least common.

The study of dermatoglyphic parameter finger tip print pattern proved to be of much help than other parameters as it was observed that the whorl pattern was significantly predominant in cases of bronchial asthma.

The whorl pattern was present significantly in predominance on the thumb of both the hands in patients of bronchial asthma.

The dermatoglyphic parameter position of axial tri-radii proved and atd angle to be not of much help. In bronchial asthma patients atd angle was significantly wider and the total finger ridge count and absolute finger ridge count were significantly higher.

The significantly low incidence of loop pattern on thumb and index finger of right hand was witnessed in patients of bronchial asthma. The higher incidence of arch pattern on little finger of left hand in bronchial asthma patients was obvious.

It could be clearly appreciated that the high number of loops and low incidence of whorls were the obvious findings in cases of asthmatic bronchitis.

In asthmatic bronchitis patients the low incidence of arch on right thumb and loop on right index finger was found to be significant.

The high incidence of loop pattern on right ring and little finger was significant.

The predominance of whorl on left thumb was highly significant. The low incidence of whorls on left ring and little finger was found to be significant.

The atd angle was wide in asthmatic bronchitis patients. The significantly higher total finger ridge count and significant low absolute finger ridge count were witnessed in cases of asthmatic bronchitis.

It was obvious in bronchiolitis patients that the loops and arches were significantly predominant.

The significantly low incidence of arch pattern on thumb, whorl pattern of index finger and predominance of arches on middle finger of right hand was witnessed.

the atd angle was appreciably wide in bronchiolitis patients. The dermatoglyphic parameters, the position of axial tri-radii, absolute finger ridge count and total finger ridge count were proved to be not of much help in diagnosing the cases of bronchiolitis.

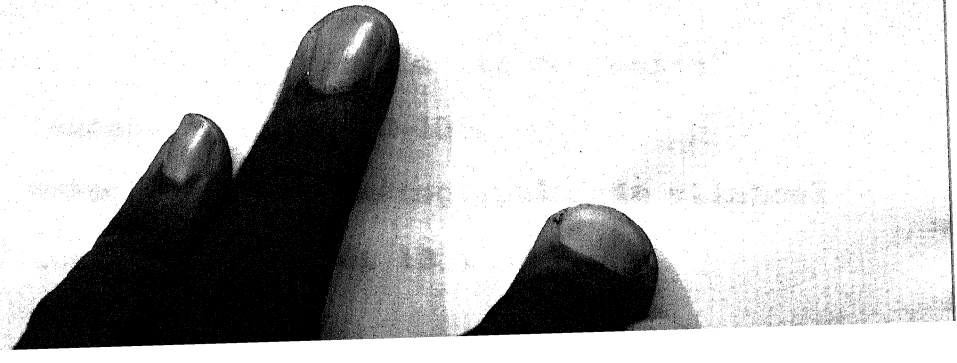
C O N C L U S I O N

CONCLUSION

At the end it is being concluded that :-

1. Amongst the finger tip print patterns, the whorl figured predominantly in cases of bronchial asthma.
2. The predominance of whorl pattern on thumb in patients of bronchial asthma is significant as it observed in 80% of the cases.
3. Significantly low incidence of loop pattern on thumb and index finger of right hand in bronchial asthma patients.
4. In cases of bronchial asthma the atd angle was significant.
5. The total finger ridge count and absolute finger ridge count was significantly higher in bronchial asthma.
6. In the asthmatic bronchitis patients, the incidence of loop pattern was highest.
7. The total finger ridge count was significantly higher in cases of bronchiolitis.
8. The absolute finger ridge count was significantly higher in patients of bronchiolitis.
9. The atd angle was appreciably wide in cases of bronchial asthma and asthmatic bronchitis.

B I B L I O G R A P H Y



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